

WHAT IS CLAIMED IS:

1. A matching-circuit impedance adjusting method for adjusting impedance of a matching circuit by, in a matching circuit having a pattern line, partly cutting out a stub protruding widthwise from the pattern line, the method comprising: at occurrence of an excessive cut-out of the stub, forming an auxiliary cut-and-removed portion by partly cutting and removing the stub so that the stub is made apparently longer.

2. A matching-circuit impedance adjusting method according to Claim 1, further comprising:

based on a relationship between cutting-out amounts for partly cutting out the stub of the pattern line and impedances of the matching circuit as well as a relationship between cutting-and-removing amounts of the auxiliary cut-and-removed portion for partly cutting and removing the stub and impedances of the matching circuit, determining a cutting-out amount, or a cutting-and-removing amount, or a cutting-out amount and a cutting-and-removing amount, for adjusting the impedance of the matching circuit to a target value by simulation or by comparison operation of an impedance measured value with information in a database; and

based on the cutting-out amount, or the cutting-out amount and the cutting-and-removing amount, of the stub

determined by the simulation or by the comparison operation of the impedance measured value with the information in the database, partly cutting out or cutting and removing the stub, so that the impedance of the matching circuit is adjusted to the target value.

5 3. A matching-circuit impedance adjusting method according to Claim 1, further comprising: in partly cutting and removing the stub to form the auxiliary cut-and-removed portion, forming a slit along a widthwise direction of the stub.

10 4. A matching-circuit impedance adjusting method according to Claim 3, wherein the slit is formed three or more in number in the stub of the pattern line so that the three or more slits are formed into comb-teeth-like cuts.

15 5. A matching-circuit impedance adjusting method according to Claim 3, wherein the slit is formed three or more in number in the stub of the pattern line so that the three or more slits are formed into staggered cuts.

20 6. A matching-circuit impedance adjusting method according to Claim 1, further comprising: in partly cutting and removing the stub of the pattern line to form the auxiliary cut-and-removed portion, forming a cut-out along a widthwise direction of the stub of the pattern line.

25 7. A matching-circuit impedance adjusting method according to Claim 1, further comprising: in partly cutting

and removing the stub of the pattern line to form the auxiliary cut-and-removed portion, forming a hook-type slit in the stub of the pattern line.

8. A matching-circuit impedance adjusting method according to Claim 1, wherein the cutting-out amount, or the cutting-and-removing amount, or the cutting-out amount and cutting-and-removing amount, of each stub of the pattern line are made different from one another.
9. A matching-circuit impedance adjusting method according to Claim 1, further comprising: changing the cutting-and-removing amount of the auxiliary cut-and-removed portion in a thicknesswise direction of the stub of the pattern line, thereby performing the impedance adjustment.
10. A matching-circuit impedance adjusting method according to Claim 1, wherein the auxiliary cut-and-removed portion is formed by, with a recessed portion previously formed along a thicknesswise direction of the stub of the pattern line, burying an insulating resin in the recessed portion and then cutting and removing the insulating resin to form the auxiliary cut-and-removed portion.
11. A matching-circuit impedance adjusting method according to Claim 1, further comprising: performing fine adjustment in accordance with impedance characteristic by combining a widthwise cutting-and-removing of the stub of

the pattern line and a thicknesswise cutting-and-removing of the stub of the pattern line.

12. A matching-circuit impedance adjusting method according to Claim 1, further comprising: with an impedance variation amount on a Smith chart changed by length and width of the auxiliary cut-and-removed portion, adjusting the impedance of the matching circuit to the target value based on a phase on the impedance.

13. A matching-circuit impedance adjusting method according to Claim 1, wherein the auxiliary cut-and-removed portion is formed by partly cutting and removing the stub with a laser beam.

14. A matching-circuit impedance adjusting apparatus comprising:

a laser irradiation device for irradiating a stub of a pattern line of a matching circuit having the pattern line with a laser beam to partly cut and remove the stub of the pattern line, thereby forming an auxiliary cut-and-removed portion;

a measuring instrument for measuring an impedance of the matching circuit;

a storage section for previously storing a relationship between cutting-out amounts for partly cutting out the stub of the pattern line with the laser beam and impedances of the matching circuit, as well as a

relationship between cutting-and-removing amounts of auxiliary cut-and-removed portions for partly cutting and removing the stub of the pattern line with the laser beam and impedances of the matching circuit; and

5 an operating section for, based on the relationships stored in the storage section, determining a cutting-out amount, the cutting-and-removing amount, or a cutting-out amount and a cutting-and-removing amount, for adjusting the impedance of the matching circuit to a target
10 value, by simulation or by comparison operation of an impedance measured value with information stored in a database,

wherein the impedance adjusting apparatus performs: irradiating the stub of the pattern line with the
15 laser beam to partly cut out, or cut and remove, the stub of the pattern line based on the cutting-out amount, or the cutting-out amount and the cutting-and-removing amount, determined by the simulation or by the comparison operation of the impedance measured value at the operating section
20 with the information stored in the database; then measuring the impedance of the matching circuit with the measuring instrument; and comparing an impedance measured value measured by the measuring instrument with the target value at the operating section, where, if the two values have a
25 difference therebetween beyond a permissible range, the

impedance adjusting apparatus performs: irradiating the stub of the pattern line with the laser beam to partly cut out, or cut and remove, the stub of the pattern line with the laser beam, based on a cutting-out amount, or a cutting-out amount and the cutting-and-removing amount, determined again with the operating section by the simulation or by the comparison operation of the impedance measured value with the information stored in the database by means of the operating section.

10 15. A matching-circuit impedance adjusting apparatus according to Claim 14, wherein in forming the auxiliary cut-and-removed portion by partly cutting and removing the stub of the pattern line with the laser beam applied from the laser irradiation device, a slit is formed widthwise of the stub of the pattern line with the laser beam.

15 16. A matching-circuit impedance adjusting apparatus according to Claim 15, wherein the slit formed with the laser beam applied from the laser irradiation device is formed three or more in number in the stub of the pattern line so that the three or more slits are formed into comb-teeth-like cuts.

20 17. A matching-circuit impedance adjusting apparatus according to Claim 15, wherein the slit formed with the laser beam applied from the laser irradiation device is formed three or more in the stub of the pattern line so

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that the three or more slits are formed into staggered cuts.

18. A matching-circuit impedance adjusting apparatus according to Claim 14, wherein in partly cutting and removing the stub of the pattern line to form the auxiliary

5 cut-and-removed portion with the laser beam applied from the laser irradiation device to form the auxiliary cut-and-removed portion, a cut-out is formed along a widthwise direction of the stub of the pattern line with the laser beam.

10 19. A matching-circuit impedance adjusting apparatus according to Claim 14, wherein in partly cutting and removing the stub of the pattern line with the laser beam applied from the laser irradiation device to form the auxiliary cut-and-removed portion, a hook-type slit is

15 20. A matching-circuit impedance adjusting apparatus according to Claim 14, wherein the cutting-out amount, or the cutting-and-removing amount, or the cutting-out amount and cutting-and-removing amount for each stub of the

20 21. A matching-circuit impedance adjusting apparatus according to Claim 14, wherein the impedance adjustment is performed by changing the cutting-and-removing amount of the auxiliary cut-and-removed portion in a thicknesswise

25 direction of the stub of the pattern line.

22. A matching-circuit impedance adjusting apparatus according to Claim 14, wherein the auxiliary cut-and-removed portion is formed by, with a recessed portion previously formed along a thicknesswise direction of the stub of the pattern line, burying an insulating resin in the recessed portion, and then cutting and removing the insulating resin with a laser beam applied from the laser irradiation device.

23. A matching-circuit impedance adjusting apparatus according to Claim 14, wherein fine adjustment is performed in accordance with impedance characteristic by combining a widthwise cutting-and-removing of the stub of the pattern line and a thicknesswise cutting-and-removing of the stub of the pattern line.

24. A matching-circuit impedance adjusting apparatus according to Claim 14, wherein with impedance variation amount on a Smith chart changed by length and width of the auxiliary cut-and-removed portion formed with the laser beam applied to the laser irradiation device, the impedance of the matching circuit is adjusted to the target value based on a phase on the impedance.